

Claims

1. A catalyst suitable for use in an esterification reaction comprising the reaction product of
 - a) a compound of titanium, zirconium or hafnium
 - b) a 2-hydroxy carboxylic acid and
 - c) a quaternary ammonium compound selected from the group consisting of tetraethylammonium hydroxide and tetramethylammonium hydroxide.
2. A catalyst as claimed in claim 1, wherein the compound of titanium, zirconium or hafnium is a compound of titanium.
3. A catalyst as claimed in claim 1 or claim 2, wherein the compound of titanium, zirconium or hafnium is an alkoxide having the formula $M(OR)_4$ in which M is titanium, zirconium or hafnium and R is an alkyl group, or a condensed alkoxide having the formula $R^1O[M(OR^1)_2O]_nR^1$ in which R^1 represents an alkyl group, M represents titanium or zirconium and n is less than 20.
4. A catalyst as claimed in any preceding claim, wherein the catalyst further comprises an alcohol.
5. A catalyst as claimed in claim 4, wherein said alcohol contains at least two hydroxyl groups and comprises a dihydric alcohol selected from 1,2-ethanediol, 1,2-propanediol, 1,3-propanediol, 1,4-butane diol, diethylene glycol or a polyethylene glycol; or a polyhydric alcohol selected from glycerol, trimethylolpropane or pentaerythritol.
6. A catalyst as claimed in any preceding claim, wherein the 2-hydroxy carboxylic acid comprises lactic acid, citric acid, malic acid or tartaric acid.
7. A catalyst as claimed in any preceding claim, wherein the molar ratio of 2-hydroxy carboxylic acid to titanium, zirconium or hafnium in the reaction product is 1 to 4 moles per mole of titanium, zirconium or hafnium.
8. A catalyst as claimed in any preceding claim, wherein the amount of quaternary ammonium compound present is in the range 0.05 to 4 moles per mole of titanium, zirconium or hafnium.
9. A catalyst as claimed in any preceding claim, further comprising a compound of zinc.
10. A process for the production of an ester, comprising reacting together an alcohol and at least one carboxylic acid, or an ester thereof, in the presence of a catalyst as claimed in any one of claims 1 – 8 to form an ester,

11. A process for the production of a polyester comprising:

a) reacting together a polyhydroxy alcohol with at least one multifunctional carboxylic acid or an ester thereof to form a polyhydroxy ester of the multifunctional carboxylic acid ,

b) polycondensing said polyhydroxy ester to form a polyester,

characterised in that at least one of steps a) and b) is carried out in the presence of a catalyst as claimed in any one of claims 1 - 9.

12. A process for the production of a polyester as claimed in claim 11, comprising the steps of:

a) reacting together ethylene glycol with terephthalic acid or an ester thereof to form a bishydroxyethyl terephthalate,

b) adding to the molten bishydroxyethyl terephthalate a stabiliser comprising a phosphorus-containing compound, a catalyst as claimed in any one of claims 1 - 8, and a zinc compound, then

c) polycondensing said bishydroxyethyl terephthalate to form polyethylene terephthalate.

13. A process as claimed in claim 12, further comprising subjecting said polyethylene terephthalate to solid phase polymerisation.